Technology *Opportunity*

Video Guidance Technology

Advanced Video Guidance Sensor and Laser Range Finder System

NASA's Marshall Space Flight Center (MSFC) has developed an advanced video guidance sensor system (AVGS) that is suited for automated spacecraft docking. This technology is an improvement over NASA's video guidance sensor (VGS). The improved AVGS system incorporates a custom-built laser range finder. With extended range-finding ability and accuracy, the range finder provides initial range-estimations and verifies data obtained by the AVGS sensors. Essentially, AVGS is the "eye" of the rendezvous operation. Because of the accuracy and richness of the information it provides, the system allows completely autonomous docking of any craft with a cooperative target.

Benefits

AVGS System

- Autonomously locates and targets satellites for rendezvous
- Provides data on each tracked target
- Offers advantages over previous VGS system
- Higher-speed tracking (75 Hz compared to 5 Hz) (could track up to 75 Hz with minor software modifications)
- Improved range (can provide detailed 6 DOF position data from 300 m)
- Less weight and less power required

Laser Range Finder (not part of AVGS)

- Extended range finding ability (5 km range with a range accuracy close to 1% of the range)
- Wide field of view
- Integration with video
- Solid-state construction

For More Information

If you would like more information about this technology or about NASA's technology transfer program, please contact:

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The Technology

NASA's AVGS system is an improved version of the earlier VGS. The laser range-finder system works by illuminating a conical field of view with a broad beam laser. The laser illuminator toggles between two matched photo detectors. High-speed digital signal processing then provides the needed range and orientation information to the vehicle navigation command system.

In operation, AVGS emits laser signals in the general direction of a target that is fitted with several retro reflectors to reflect signals back to the sensor. Video images of the reflected laser signals are analyzed to determine the presence of the target in the field of view and the relative position between the AVGS and the target. One bank of retro reflectors on the target helps locate the target from 300–1,000 m away. Once within 300 m, a second bank of finer-precision retro reflectors can give 6 DOF position data to an accuracy of +/- 1 inch.

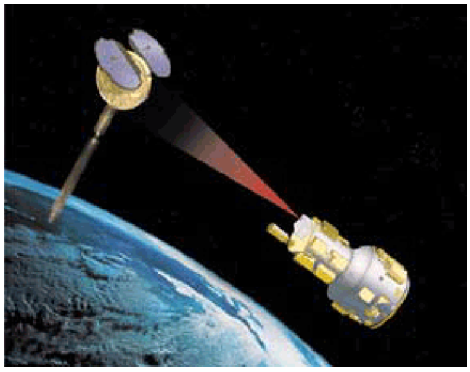
Commercial Applications

AVGS System

- Satellite tug: On-orbit fueling, repair, rescue, maintenance, and construction
- Automated robotic warehouse applications
- Navy ship-to-ship logistics
- Sensors for automated highways

Laser Range Finder (not part of AVGS)

- Truck/aircraft/ship docking
- Helicopter landings in extreme conditions
- Surveying



The DART spacecraft will be equipped with an Advanced Video Guidance Sensor. This system is an updated version of equipment that was successfully tested on two Space Shuttle flights during the late 1990s. *Credit: NASAexplores*

Partnership Opportunities

This technology is part of NASA's Technology Transfer Program, which seeks to stimulate development and commercial use of NASA-developed technologies. NASA is flexible in its agreements, and opportunities exist for licensing and/or joint development of this advanced video guidance sensor technology.

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